

FIG. 1.—Path of tornado at Goulds, Fla., Sept. 10, 1919. (Drawn by Biscayne Engineering Co.)



FIG. 2.



FIG. 3.—Wreckage from tornado at Goulds, Fla.



FIG. 4.—Note pieces of tin roofing wound around trees.

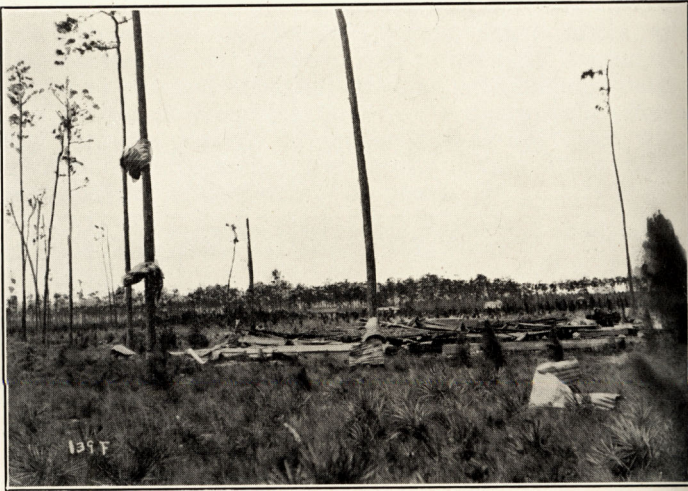


FIG. 5.—Tornado damage about 1 mile west of Goulds.

PAPERS SUPPLEMENTING THE DISCUSSION OF THE WEST INDIAN HURRICANE OF SEPT. 6-14, 1919.

A TORNADO WITHIN A HURRICANE AREA.

By RICHARD W. GRAY, Meteorologist.

A tornado occurred at Goulds, Fla., a small town 20 miles southwest of Miami, on September 10, 1919, between 1:00 p. m. and 1:15 p. m., eastern summer time.

This tornado is of special interest in that it can be said to have occurred within a hurricane area. The severe tropical disturbance that passed through the Florida Straits and, several days later, caused such an appalling loss of life and destruction of property at Corpus Christi, Tex., was central during the afternoon of September 10 over the extreme southeastern Gulf of Mexico. The center of this storm, therefore, was probably within 125 miles of the path of the tornado, and the southern part of the Florida peninsula was still under its influence.

The high winds that prevailed over extreme southern Florida in connection with the tropical storm had diminished by the morning of the 10th, but a moderate gale was still blowing, and the wind continued at this force at Goulds until just before the occurrence of the tornado, when there was a lull for probably 15 minutes.

The tornado developed either over the ocean or Biscayne Bay, and its original form was undoubtedly that of a waterspout. It moved in a west-northwest direction, directly with the strong southeast wind that prevailed at the time on the southeast Florida coast. After leaving the bay, it crossed a 3-mile stretch of marsh land, and there were evidences that this part of the path was extremely narrow. It then entered a pine wood immediately east of Goulds, where the path rapidly widened. At Goulds, the path was about 600 feet in width. After passing over Goulds, the storm moved over a cleared area of about one-half mile in extent, when it entered another pine wood. It is interesting to note that the path through this second wood was 100 feet, or less, in width. The storm continued west-northwest, and was seen to disappear over the Everglades, about 14 miles from the point of entry on the shore of Biscayne Bay. Fig. 1 shows the tornado path.

The tornado was attended by the characteristic pendant cloud, which was described by several persons as having a waving motion, with the detached end apparently moving through a space of 100 feet. It was not accompanied by rain, but the air in the path of the storm was filled with a fine mist.

There were many evidences of the whirling motion of the air. In the first wood through which the storm passed (fig. 2), the uprooted and broken trees apparently fell in all directions. At Goulds, debris from a demolished building was carried across the path of the storm and deposited on the side opposite to which the building stood. A hotel and a large packing house, which were on the northern edge of the path, were lifted from their foundations and moved 15 feet toward the center of the path.

In the second wood (fig. 4), where the path had narrowed to 100 feet, or less, there was no indication of a whirl. All the fallen trees, with one exception, lay with their tops toward the northwest, being practically parallel. One tree which fell toward the southwest was apparently leaning in that direction before the storm occurred. The fallen trees in this narrow part of the path indicated a straight blow, and it was apparently here that the storm developed its greatest force. A dwelling in a small clearing in this wood was completely demolished, and the concrete foundations of the house were pulled out of the ground. Many of the trees had

large pieces of tin and sheet-iron roofing wrapped around them, or lodged in their tops (figs. 4 and 5), these pieces of roofing being part of the debris from wrecked buildings at Goulds, about 1 mile to the east.

At Goulds, 19 buildings were damaged and 6 were demolished. Some of the damaged buildings will have to be practically rebuilt. The monetary loss was approximately \$25,000.

There was no loss of life in connection with the storm, but five persons were injured by flying debris, and one girl was seriously cut by a piece of flying glass. The absence of fatal accidents was due to the fact that the occupants of all buildings that were demolished heard the approaching storm in time to escape into the open, where they threw themselves upon the ground.

In one instance, five persons escaped injury by taking refuge behind a large boiler. This boiler was struck by pieces of flying timber from the building that had just been vacated.

In another case, a man ran out of the rear of a building just as it was on the point of collapsing. The roof of the building passed over his head, and he was uninjured.

Mr. W. H. Cawley saw the storm approaching, and, getting into his automobile, he started for his home, which is a short distance west of Goulds. He was overtaken by the storm and by flying debris, and a large piece of sheet iron struck the top of the automobile and cut it off, without otherwise damaging the car. Upon arriving home, Mr. Cawley found that his residence was intact, but that his garage, which was within 50 feet of the house, had been demolished.

The post office was one of the buildings completely destroyed, and the postmaster escaped from the building only a few seconds before it was razed. Fortunately, he ran to the rear of a packing house, which, though lifted from its foundations, was not blown down. He was thus protected from flying debris, with which, he states, the air seemed to be filled.

TORNADO NEAR HOBBS, N. MEX., SEPTEMBER 19, 1919.

By E. H. BYERS, Cooperative Observer.

NOTE.—So far as is known this is the first account of a real tornado within the borders of this State. Hobbs is in the extreme southeast border county of the State in a flat, open prairie country.—C. E. Linney, Section Director.

About 4 o'clock on the afternoon of the 19th of September, 1919, a small tornado formed south by east of this station (Hobbs, Lea County, N. Mex.), at a distance of about 4 miles. (See map, p. 640.) A shower first formed to the southeast, with a heavy electrical display, strato-cumulus clouds gathering on the extreme west of this formation, in which a funnel-shaped cloud formed and let down from the general level of the surrounding clouds. This funnel pointed westward to where it hit the ground at an angle of about 45°. It traveled over the ground in a direction south of west for a distance of about 1 mile. Fortunately, there were no permanent improvements in its pathway, so that no damage was done, except to destroy some little vegetation which lay in its way. Its course was marked by a column of red dust, which gradually grew thinner, until